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Study of exotic resonances in pp collisions with ALICE at LHC

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Quantum Chromodynamics (QCD) is a fundamental theory on which the Standard Model of particle physics is based, describing strong interactions between quarks and gluons. While conventional hadrons are composed of bound states of quark-antiquark ($q\bar{q}$) pairs or three-(anti)quark (qqq or $\bar{q}\bar{q}\bar{q}$) combinations, QCD also predicts exotic hadrons, such as $\mathrm{f}_0(980)$ and $\mathrm{f}_1(1285)$, which could be a tetraquark state or molecular state of mesons. Additionally, QCD predicts the existence of glueballs, which are bound states of gluons whose internal structure remains unknown, offering unique insights into the non-perturbative regime of QCD. The large statistics data collected by the ALICE detector in Run˜2 in the pp collisions at $\sqrt{s} = 13$ TeV is used to perform detailed studies of exotic resonances.

This contribution reports on the measurements of production yields, mass spectra, and decay channels of the resonances $\mathrm{f}_0(980)$ and $\mathrm{f}_1(1285)$. Based on the lattice QCD prediction of the lightest scalar glueball candidate in the mass range of 1500 to 1700 MeV/c^2, we will also show the measurements of higher mass resonances at midrapidity in the mass range of 1000–2000 MeV/c^2 through $\mathrm{K}^0_\mathrm{S}\mathrm{K}^0_\mathrm{S}$ and $\mathrm{K}^+\mathrm{K}^-$ decay channels, aiming to explore their internal structure, production mechanisms, and alignment with QCD predictions.

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